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(54) **Mat and method of manufacture.**

(57) A mat eg. synthetic grass or carpet comprises a base having a pile formed of yarn of co-extruded polymers of different degrees of longitudinal shrinkage, the yarn having been treated so that the free ends of lengths thereof are not exposed.

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## Description

## MAT AND METHOD OF MANUFACTURING

The invention relates to a mat formed of yarn of polymeric material and to a method of manufacture thereof. The mat may be used as a display base, a sports surface, synthetic grass or the like.

It is one object of this invention to provide a mat of the type specified which has greater resistance to applied pressure and other advantages.

According to one aspect of the invention there is provided a mat comprising a base, a pile being present on top of the base, the pile comprising substantially upright lengths of yarn, characterised in that the yarn comprises coextruded polymers of different physical properties, the yarn having been treated so that the free ends of the lengths are not exposed.

In another aspect, the invention provides a method of making a mat as defined, characterised by coextruding polymers of different physical properties, forming a yarn of the coextrusion, securing lengths of the yarn to a base to form a pile thereon, and treating the lengths so that the free ends of the lengths are not exposed.

The polymers of which the yarn is formed may be two different polymers, or the same polymer chemically, but having different physical properties. Examples include: polyethylene, polypropylene, low temperature polyesters, ethylene vinylidene acetate, nylon and copolymers of any of these may be used as the co-extruded polymers. Where one polymer is used in two different forms, this may be, for example, polypropylene having different molecular weights, as a result of which the two forms will have different thermal properties. In another arrangement one form may include a filler so that it will have a different rate of longitudinal contraction compared with the filler free form.

The strands may range from about 250 denier to about 12000 denier. In a preferred feature, the polymers are heat sensitive and one is more heat sensitive than the other so that upon heat treatment they will contract at different rates, causing the lengths of yarn to curl over. Most preferably the heat treatment is one which takes place in the course of making the mat, eg. securing the pile to the base using a latex.

In a preferred feature, the polymers are selected so that the yarn has the same light reflective properties over all its surfaces so that crushing will not cause crush marks to appear.

It is preferred that the polymers are selected for resistance to ultraviolet light.

The base may be woven or knitted or a thermoplastic or thermoset membrane or layer.

A mat of the invention is advantageous because it has a high degree of springiness and is thus resistant to pressure. Because the ends of the lengths of yarn in the pile, eg. tufts, are curled over, the mat appears uniformly green, and when pressure is applied, not only will crushing be resisted, but there will be little or no evidence. The mat may be used as a ski slope, bowling green, residential

carpet, display base, synthetic grass or the like. Because of the treatment of the upright lengths, the surface properties of the mat will be the same, or similar, in different directions, i.e. in the case of a sports mat, there is a bias-free surface.

In order that the invention may be well understood, it will now be described by illustration with reference to the following examples.

## EXAMPLE 1

A mat was formed as follows: 4000 denier yarn consisting of 16 strands each of 250 denier, were tufted on a 5/16 inch (about 0.8 cm) gauge through a conventional polypropylene woven carpet backing at 9 stitches to the inch (2.54 cm) to produce a cut pile 1/4 inch (about 0.6 cm) high. The strands were each composed of two layers, one being polypropylene and the other polyethylene, so that they have different rates of longitudinal contraction on exposure to heat. The resultant pile fabric was heat-treated in an oven at 140°C for 2 minutes. This caused the ends of the tufts to bend over and twist round by around 1/16 inch (about 0.16 cm) on the top of the pile surface. Before heating, the rows of stitches were distinct and separate, giving a unidirectional bias. After oven treatment, no such stitch rows were apparent and the curling of the yarn filled the spaces. The surface was uniformly the same across the fabric as well as down the fabric. When the mat was subjected to pressure, it was observed that it was springy, and there was no evidence of crushing or the like.

## EXAMPLE 2

A tape of 2000 denier and 80 microns thick was co-extruded as two layers, one of which was 100% polypropylene having a melt flow index of 15 and the other of which was the polypropylene including 5% by weight of a black pigment masterbatch. The tape was stretched and fibrillated and then tufted through a base at the rate of 10 stitches to the inch to form a pile 8 mm thick. A carpet backing latex was applied and allowed to dry and the assembly was then placed in a hot air oven at 140°C. The ends of the tape curled over so that no free edge was exposed. An outdoor carpet coloured black and white, suitable for use on, eg. a patio was formed, the carpet having a high degree of springiness and being resistant to crush marks.

## Claims

1. A mat for use as synthetic grass, carpet, sports mat or the like, comprising a base, a pile being present on the base, the pile comprising substantially upright lengths of yarn, charac-

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terised in that the yarn comprises coextruded polymers of different physical properties, the yarn having been treated so that the free ends of the lengths are not exposed.

2. A mat according to Claim 1 characterised in that the polymers are of different colours.

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3. A mat according to 1 or 2 characterised in that one polymer has a different degree of longitudinal shrinkage compared to the other.

4. A mat according to any of Claims 1 to 3, characterised in that the polymers are selected so that the yarn has substantially the same light reflective properties over all its surfaces.

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5. A mat according to any of Claims 1 to 4 characterised in that the polymers are selected for resistance to ultraviolet light.

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6. A mat according to any of Claims 1 to 5 characterised in that the base is woven or knitted, or a thermoplastic or thermoset membrane or layer.

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7. A method of making a mat characterised by coextruding two polymers of different properties, forming a yarn of the coextrusion, securing lengths of the yarn to a base to form a pile thereon, and treating the lengths so that the ends thereof are not exposed.

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8. A method according to Claim 7 characterised in that one polymer is more heat shrinkable than

9. A method according to Claims 7 or 8 characterised in that the heat is applied to the yarn during latex treatment.

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10. A method according to Claim 9 characterised in that the heat is applied in a hot box.

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European Patent  
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# EUROPEAN SEARCH REPORT

Application Number

EP 88 30 6937

DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X, Y	FR-A-2 014 861 (DEUTSCHE LINOLEUM-WERKE AG) * Claim; page 1, lines 14-20, 29-32; page 2, lines 31-35 *	1, 3, 7, 8
Y, A	US-A-3 940 522 (E.I. DU PONT DE NEMOURS & CO.) * Claims 1, 12-14; column 4, lines 65-68; column 5, lines 56-62; column 7, line 61 - column 8, line 16; column 9, lines 42-62 *	1, 2, 3, 7, 8
A	US-A-4 061 804 (AKZONA INC.) * Claims 1, 4, 15, 20 *	1, 5
		<b>TECHNICAL FIELDS SEARCHED (Int. Cl. 4)</b>  A 47 G E 01 C D 04 H D 01 F D 05 C
The present search report has been drawn up for all claims		
Place of search <b>THE HAGUE</b>	Date of completion of the search <b>19-09-1988</b>	Examiner <b>CATTOIRE V.A.</b>
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure F : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document		

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